Comp. Zool.," Harvard, No. iv.), a most excellent memoir, containing valuable disquisitions on the affinities of various genera, and excellent notes on the geographical distribution of the species and the nature of the bottom on which the dredgings were made. The memoir contains the results of some interesting researches on the relations of the Rugose to the Henactinian corals, in connection with the account of the aberrant genus Haplophyllia. The deep-sea Antipalliaria and Actinidæ are described in it, as well as the stony corals, and the genus Pliobothrus, with great acumen, referred to its proper place amongst the Hydrozoa. A second memoir on deep-sea corals was contributed by Count Pourtales to the account of the zoological results of the *Hassler* Expedition, and many others on this and other zoological subjects are to be found in the *Bulletin* of the Harvard Museum of Comparative Zoology. The last work which appeared from his pen is the description of the plates of corals in the Report on the Florida Reefs, by the late Prof. Agassiz, which has just been published by Alexander Agassiz, by the permission of the superintendents of the U.S. Coast Survey. These plates are the most perfect and beautiful representations of corals that have as yet been published anywhere. They were drawn under the immediate direction of Prof. Agassiz.

Count Pourtales' name is indissolubly connected with deep-sea zoology by means of the genus Pourtalesia, named after him. Pourtalesia, a sea-urchin, one of the Spatangidæ allied to Ananchytes, was found by the *Challenger* expedition to be one of the most ubiquitous and characteristic deep-sea animals. Numerous species of the genus new to science were obtained by the expedition in deep water, some of them being of most extraordinary shapes. In conclusion it need only be added that Count Pourtales' kindness and good-nature were as much appreciated by English naturalists as elsewhere. He was most generous, always ready to give advice to naturalists working in the same most difficult field as himself, to supply them with specimens for investigation, and to discuss in the freest manner, with perfect impartiality, any question of systematic arrangement. He will be regretted by many friends in England, to which he paid frequent visits on his way to his native country, his last visit having been made in the spring of the present year.

H. N. MOSELEY

THE BRITISH ASSOCIATION AT SWANSEA

PREPARATIONS of the most unstinted kind are now being made at Swansea to insure to the members of the British Association a hearty, hospitable welcome, a good opportunity for the interchange of scientific results, and an instructive and healthful summer holiday during their visit in the week commencing on Wednesday, August 25 next. The Excursion Committee have already made arrangements for visiting the more interesting places in the district. The presidential address will be delivered on Wednesday, and a portion of Thursday, August 26, will be devoted to an excursion, limited to 200 members, to the celebrated iron-works and collieries at Dowlais, by special invitation of G. T. Clark, Esq., of Dowlais House. As this excursion will take place so early, members who intend joining in it should send in their names to the Local Committee as soon as possible before their arrival in Swansea. The return will be made in time for the reception *soirée*, which the Mayor of Swansea (Alderman John Jones Jenkins) will give in a fine wooden pavilion capable of accommodating 6,000 people.

Saturday, August 28, will be almost entirely devoted to excursions to the Gower Coast, Penrice Castle, Oxwich Bay, Arthur's Stone, Worm's Head, Bishopstone Valley and its underground river; Bacon Hole and other bone-caves, with the Bays; the Via Julia at Langhor, with ruins of castle, hospitium, sanctuary, and collieries and tin-works; Llandilo, Golden Grove, Carreg-Cennen, and Dynevor Castle; and by sea to Lundy Island and Ilfracombe.

Among the sciences geology this year takes the foremost place in the person of the distinguished president, Prof. Ramsay. There are few districts which comprise, within so small an area, so many geological formations as Swansea, and fewer still that offer such problems for solution and such advantages for useful study. To the west of the town an axis of old red sandstone is thrust up through lower shales and limestones, and the stratifications of the whole neighbourhood have been dislocated and curiously denuded. Along the coast of the Bristol Channel for twenty miles the grand limestone cliffs are fissured and distorted until they exhibit almost every variety of dip and strike. Here are bold projecting torrs, inhabited by sea-birds; undisturbed sandy bays, the realised dream of the bathing enthusiast; and the celebrated bone caves, explored by Buckland and Col. Wood, and described by Falconer. The list of their fossil contents is a long one, including, with the exception of the *Drepanodon* (*Machairodus*) of Kent's Hole, all the larger-sized extinct carnivorous and herbivorous mammalia found in all the caves of England put together. Of the smaller-sized genera, too, Bacon Hole and its neighbouring caverns contained representatives of every one save *Lagomys* and *Spermophilus*. In Mewslade Bay Mr. Prestwich discovered a fine example of raised beach, and beneath the sands of Swansea Bay are well-exposed beds of peat—roots, stems, branches, and leaves of the silver birch, and larger vegetation, the remains of a forest still retained in local tradition. On the other side of the bay, in these deposits, have been found antlers of splendid proportions, and British and Roman implements. The *Pholas candida* is found in the decayed wood, and the rocks at the western extremity of the bay abound with *Lithophagi*, the most numerous being *Saxicava rugosa*. The South Wales coalfield, the largest but one in Britain, is brought within easy workable range by a great east and west anticlinal and several smaller axes, and is so cut into by deep river valleys that the coal is generally worked by means of adits and galleries. As a consequence of this fortunate conformation of carboniferous strata and surface, the deepest coal-pit in the whole basin—Harris's Deep-Navigation Steam Colliery, in the Aberdare Valley—does not exceed 700 yards of vertical depth. There is still considerable difference of opinion as to the identity of certain beds which occupy the place of the millstone grit. To the north and east of the basin the grit is of the usual kind, save where the sands and gravels are compacted into a hard, whitish, quartz-like rock; but to the west of Swansea the equivalent beds change into siliceous under-clays, with coal-seams above them. At Lilliput, in Swansea Bay, there are two interesting outcropping ridges of this kind; and a little farther west still the coal-measures are found to lie conformably on the limestone, with the exception of those in the neighbourhood of Oystermouth Castle, where Sir Henry de la Beche found a section "of a kind of lenticular mass which fines off to the east and west," and "was formed under minor conditions of a different nature." At the head of the Swansea Valley there is said to be "a seam of coal occurring in the millstone grit." The Town hill sandstones, which form the highlands in the neighbourhood of the town, and the high bold escarpments of which may be traced almost all round the Basin, are equivalent to the Pennant rocks of the Bristol district. They are peculiarly interesting for the great quantity of *detrital* coal they contain. A few minutes' walk from the town to the quarries enables the geologist to see the curiosity *in situ*. Even the same coal pebble is sometimes seen to consist of coal of two distinct ages. The markings beautifully show how the newer plants were pressed down

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around the coal-pebbles, which, from their greater hardness, have left their impress in the plants; but the crystallisation of the former has a uniform parallelism with the faces of its cleavage, while the cleavage of the older coal is parallel with the sides of pebbles, which occur in all positions, sometimes in the form of a rhomboid, with its edges and corners rounded by attrition. To the east of Swansea, near Southern Down and Dunraven Castle, there are remarkably fine exposures of Lower Lias full of *Gryphea incurva*, with large ammonites and belemnites. Last year an enormous slab was dug out of the Trias rocks at Shortlands, which bears five trifid impressions in a clear series. The length of each footprint is 9¼ inches, and it appears to have been made by "some solidly-built short-legged creature." A little further east the Rhætic Passage Beds are laid open for a distance of more than twenty miles to Penarth Headland, where *Carduum rhæticum* and numerous other characteristic fossils are found. Through these strata there are many railway cuttings and no less than six passenger stations, so that this district is perhaps the best in the whole country for the study of Rhætic strata in the fields. The peninsula of Gower, west of Swansea, besides offering such scientific attractions as bone-caves, underground water-courses, raised beaches, &c., is remarkable for the great beauty and variety of its scenery. Bold highlands and beetling cliffs alternate with heathery downs and commons, well wooded valleys through which trout streams flow, and rocky gorges, half hidden by luxuriant growths of fern. Tumuli, Druidic stones, Roman and Danish earthworks, and a round dozen Norman castles, dating for the most part from the days of William Rufus, lend additional charm to the district, which is peopled by the descendants of a colony of Flemings, who still retain many characteristic words, idioms, and customs, which the ethnologist may profitably study. The lonely granitic rocky island at the entrance to the Bristol Channel is associated with the geology of the Barnstaple district; but it has a history all its own, and a peculiar species of rat. Ilfracombe, on the Devonshire coast, is only two hours from Swansea Pier by a fast-going steam-boat. At Pembroke Dock, on the occasion of the visit, there will be a considerable number of notable ships and corvettes of war, and the *Great Eastern*. Minor excursions will run through the magnificent haven of Milford, and to Tenby, while arrangements are made to take fifty persons by road to St. David's City and Cathedral, with the ruined palace and colleges of the see of Menevia, in the utmost limits of Pembrokeshire.

All these excursions are fixed for Saturday, the 28th, and the Local Committee exact that all applications be sent in before 1 p.m. of the previous Thursday.

On the succeeding Thursday, September 2, the excursions, which are very numerous, will be for the most part to collieries and works. Perhaps the chief interest attaching to Swansea is its metallic industries, of which the district is a chief centre. The copper trade has flourished here for a century and a half to two centuries, but though various new processes have been tried from time to time, practically the oldest dry process, called the Welsh method, is still in use. It is affirmed that nine-tenths of the copper-smelting of the kingdom is done here. The sulphurous and arsenious fumes from these works have entirely denuded the hill-sides of verdure, but it cannot be shown that they injure human health. Among the many inventions for the consumption of this smoke, are washing it with water, collecting the sulphurous acid and converting it into sulphuric acid, and the use of deposit chambers and high chimneys. These processes may be seen at Hafod, the works of Mr. H. H. Vivian, M.P. The other excursions on the same day include various large tin works, where the whole of the processes of making the iron sheets and tinning them may be seen, and the visitors will be entertained at luncheon by the Worshipful Mayor at his Cwmbwrla Tin-plate Works; to the Landore Siemens Steel Works, where steel is made in gas regenerative furnaces by the Siemens-Martin process, and hammered and rolled and tested for rails, armour-plates, ship and boiler plates, knives, needles, wire, and all other commercial purposes, and visitors will be entertained at lunch by Dr. Siemens; to the Dyffwyn Collieries at Neath, the Navigation Colliery at Quaker's Yard, the Penrhiwceiber Colliery, Mountain Ash, &c., the most important coal winnings in the district, at each of which places visitors will be entertained. Visitors to Neath Abbey and district will take luncheon in the ruined refectory, and those to the Vale of Neath Waterfalls in the caves. At their Melyn Decorative Tin Works Messrs. Leach, Flower and Co. will show their extremely interesting processes and give a luncheon; Mr. J. T. D. Llewelyn, of Penllergare, will receive 100 visitors at his ancient and beautifully-situated residence five miles from Swansea; and Mrs. Crawshay will entertain on this day fifty visitors at Langorse Pool, Brecon. The oyster-dredging expedition in the Bay will start from Swansea Piers, and visit the Lighthouse Rock and Battery, luncheon being served on board. The neighbouring works, which may be easily reached from the town, include the manufacture of patent fuel in the old and in a perfectly new perforated form; sulphuric acid, phosphate manures, cobalt, silver, nickel, lead, spelter, sulphate of ammonia, oxalic acid, distillation of wood, alkalies, &c., &c.

Applications for tickets for these excursions on Thursday, September 2, must be made not later than the forenoon of the previous Monday.

Among the special attractions which will take place concurrently in Swansea are an agricultural show, a flower show, and especially an exhibition of local productions and processes. The exhibition of machinery will be on an extensive scale, and the greater part will be in motion. The more interesting portions of the machinery in motion and the loan exhibition of scientific instruments will be retained as an additional attraction to the second *soirée*.

The accommodation in the town and in the picturesque suburban watering-place of Oystermouth or The Mumbles is in every way ample, and the hospitality will be generous, but it would much facilitate the work of the Local Committee and add greatly to the satisfaction of visitors themselves if they would give timely and sufficient notice of their intention to be present on the occasion.

THE HIGH PLATEAUX OF UTAH[1]

UNTIL a few years ago the geography of the high grounds of the western part of North America was depicted, even on the best maps, in a manner which now appears almost like a caricature of nature. So much had been said and written about the Rocky Mountains that the popular imagination was wont to picture them as a colossal, rugged, and almost impassable range, extending continuously down the backbone of the continent, and serving generally as the watershed between the Atlantic and Pacific Oceans. The progress of research, however, dissipated this delusion by showing that, instead of one continuous chain of mountains, a vast area of country, extending from the British possessions far down into the Southern States, has been upraised into elevated plains or table-lands, and that these at various distances have been ridged up by lenticular mountain-chains, sometimes parallel, sometimes *en échelon*, and trending generally in a meridional direction. The term "Rocky Mountains" is now commonly restricted to the most easterly line of

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[1] "Report on the Geology of the High Plateaux of Utah." With Atlas. By Capt. C. E. Dutton, U.S.A. Geographical and Geological Survey of the Territories. J. W. Powell in charge. (Washington, 1880.)

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